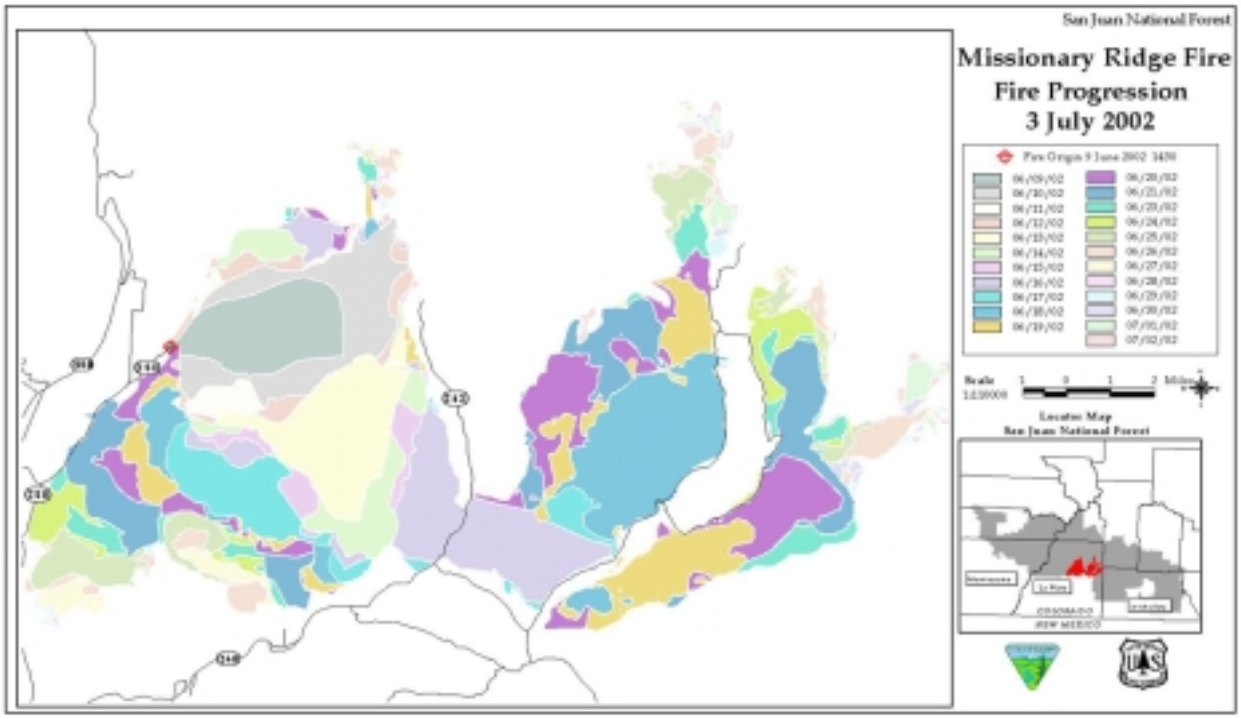
Burned Area Emergency Response Team

Missionary Ridge Fire
The Aftermath

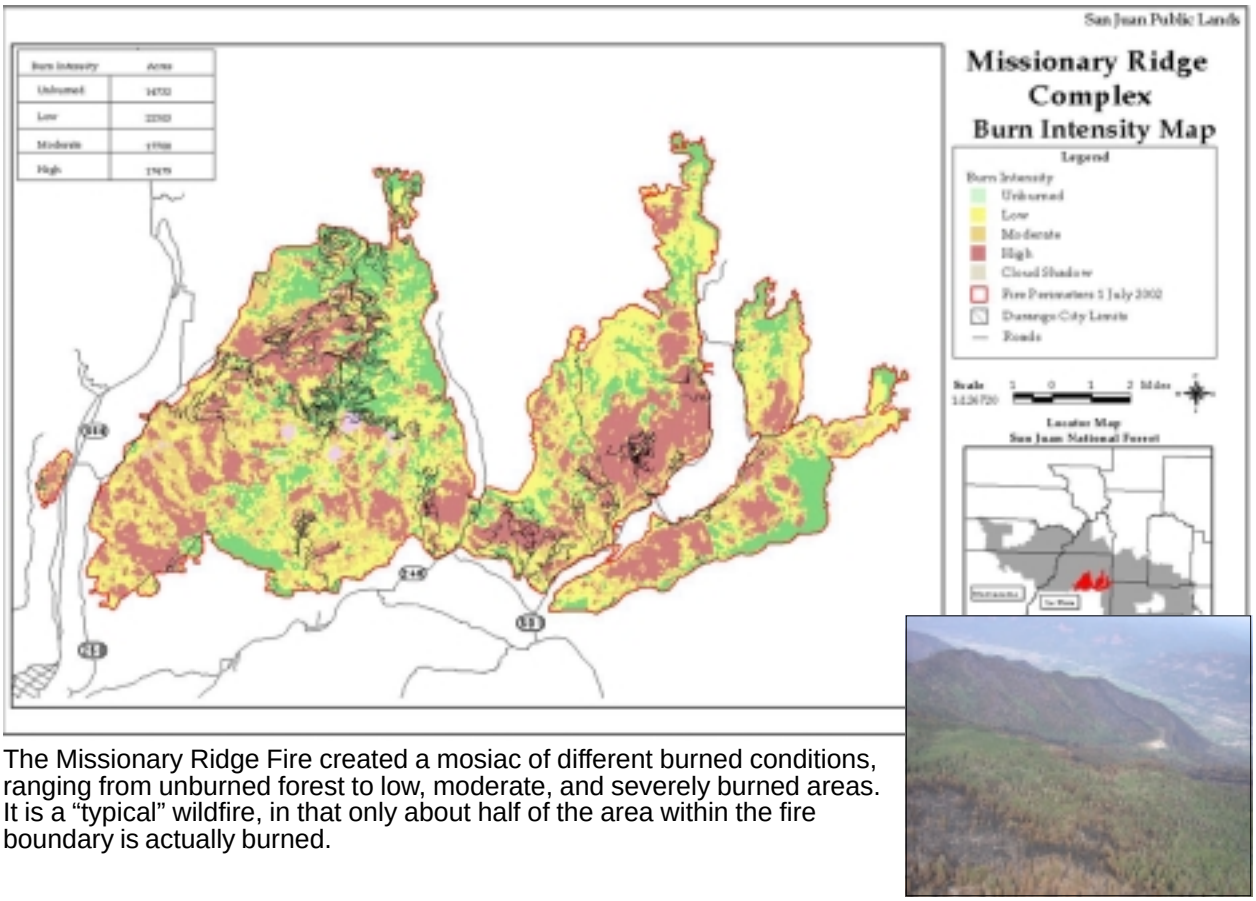
A huge smoke column rises above the Animas Valley.

What Did It Do?
What Happens Next?

The wildfire stage was set: by early June the Southwest Colorado mountains had only 20% of their normal snowpack, and Durango had received only 1.3” of precipitation for the year to date. Everything was bone dry and fire officials were deeply concerned. Then, on Sunday June 9 a new chapter in our history began. A plume of thick smoke rose up above the Animas Valley just 12 miles north of Durango. Flames 150 feet high raced over Missionary Ridge toward the Florida River drainage, and the fire exploded to 7000 acres. The Missionary Ridge Fire was underway. Just as suddenly, on June 25 the Valley Fire erupted on the west side of the Animas Valley and spread quickly. The battle to contain the fires and save homes is now a part of our history. A total of 70,662 acres and 56 homes were burned. Our memories of the fires will last a lifetime.



Daily growth of the fire. From its origin on the Missionary Ridge road, the fire spread rapidly into the Florida, Vallecito, and Pine River drainages.



The Missionary Ridge Fire created a mosiac of different burned conditions, ranging from unburned forest to low, moderate, and severely burned areas. It is a “typical” wildfire, in that only about half of the area within the fire boundary is actually burned.

Now that the drama of fighting the fires is over, the recovery process begins on many fronts. This article will focus on describing the present and future impacts of the fire on and off the National Forest, and providing some information on how the recovery process will likely unfold.

Is it Devastation or Not?

Many people who have driven through the burned area have remarked that it is not as bad as they thought it would be. While there are many severely burned areas, there are also many areas not burned at all. Overall, only 31% of the area was severely burned, and 30% was moderately burned. The remaining 39% was either lightly burned or unburned. This is typical fire behavior. The fire created a mosaic of different conditions ranging from unburned to severely burned. This is caused by differences in fuels available, slope, wind, dryness, and temperature when each area burned.

The severely burned areas of the fire tended to be steeper hillsides densely covered with conifers (pine, spruce, and fir), where high fuel levels were dry from the drought. In many ways, these areas will be the center of attention in terms of the effects of the fire and rehabilitation efforts, which will be discussed in the following sections.

Examples of unburned forest, and low, moderate, and high burn intensity. Most of the conifer trees in the low intensity burns will survive, some in the moderate intensity burns will survive, and none in the high intensity burns will survive.

Vegetation Recovery

It's difficult to accurately predict the rebirth of a forest after a wildfire. The speed and extent of recovery in a particular area depend on the plant community and how severely it burned. In the case of the Missionary Ridge Fire, the vegetation was in the process of leafing out for the season, and was already severely stressed because of the historic drought. This means, unfortunately, that the trees and other vegetation were caught in a very vulnerable condition when the fire occurred. As a result, we would expect the vegetation recovery to be less vigorous and more variable, even after rainfall, than that observed on other fires.

However, all is not gloom and doom. Nature has equipped many plants to recover quickly from fire. When the above ground stem is killed, the roots are stimulated to send up new shoots. Such is the case with species like Gambel oak, quaking aspen, and most other shrubs, grasses, and forbs. This also includes many wildflowers. Some trees like ponderosa pine and Douglas-fir have thick bark which insulate growing tissues from lethal temperatures. The soil contains many dormant seeds waiting for the right conditions to germinate and grow. Lodgepole pine (which was planted on Missionary Ridge in the 1950's) has cones that open and release their seed when they are stimulated by the heat of a fire. Given these adaptations to fire, recovery of many plants will occur, often rapidly.

Gambel oak (top) and quaking aspen (bottom) sprout profusely from their roots after the stems are killed by fire. The acreage of these species is expected to increase after the fire.

Gambel oak and aspen are common species in the area burned by the fires. They can both occur in pure stands, but are also present to a greater or lesser degree in many other forest types. In a non-fire situation, conifers successfully out-compete aspen, often

reducing it to a minor component. However, after a fire occurs, aspen may regenerate into a pure stand. This is due to the extensive sprouting from roots when the main trunk of the aspen is destroyed. The same is true for oak, except that the conifers are often less able to out-compete it once it has become established. Overall, we should expect both the aspen and oak components to greatly increase after the fire.



Although much of the foliage is severely scorched in these two photos, the trees may survive because sufficient healthy foliage remains to support the tree.

The conifers (Utah and Rocky Mountain juniper, ponderosa pine, Douglas-fir, white fir, sub-alpine fir, and Engelmann spruce) are more limited in their response to fire. Unlike many deciduous trees and shrubs (aspen, oak, etc), the root systems of conifers do not regenerate new shoots. In order for a conifer to survive, some of the roots, the cambium of the main trunk, and buds must survive. Unfortunately, most of the conifers were in the shoot elongation phase of their spring growth at the time of the fire. These tender shoots were especially vulnerable to damage, and there are no buds for future growth.

Because of the lack of buds, our best predictor of survival for the conifers will be the amount of scorched foliage. In general, if at least one-third of the foliage is still green, the tree has a chance of surviving. The greater the amount of green foliage, the better the prognosis. If possible, the tree should be examined for intact, healthy buds. It is possible that a tree did not begin shoot elongation because of the drought or cooler conditions, and healthy buds still remain on the tree – they should be firm and flexible and not break easily.

In areas where all of the conifers are killed by the fire, the only way to re-establish them is by seeding or planting, which is a slow process. Fire often provides a suitable mineral soil seedbed, and nearby trees provide seed, so natural regeneration will often be successful.

The seeds of many shrubs and forbs (wildflowers, weeds) can persist in the soil for years. A fire can open an area to greater sunlight and warmth which stimulates the germination of some seeds. Hard seeds with thick seed coats are ruptured by fire, allowing the seed to absorb water and germinate. Raspberry, gooseberry, currant, plum, and chokecherry seed are stimulated in this way.

Herbs and grasses return rapidly after a fire. They resprout from underground roots and crowns, and dormant seeds in the soil are stimulated to germinate.

Many grass species have underground rhizomes that allow them to regenerate readily after fire. Bunch grasses have crowns beneath the soil surface that are insulated from the effects of fire.

Taking all of these ecological mechanisms of plant survival into account, we are confident that the revegetation of the burned areas will proceed as nature planned. Because of the drought, we expect the re-growth this year to be only a minimal amount to sustain the plant. However, next year, assuming better moisture conditions, we expect a much stronger response. Only on areas with severely-burned dense conifers, e.g., dense ponderosa pine or spruce-fir, with no oak or aspen present, do we expect to have deficient vegetation recovery.

Effects on Soils and Watersheds

In a normal forest watershed the vegetation and the litter layer on the ground break up the intensity of severe rainstorms, hold the soil in place, and slow runoff, giving the water time to soak into the ground. Healthy watersheds filter the water and release it gradually. When a fire destroys the vegetation and litter layer in a watershed, the potential for severe flooding and soil erosion exists for a period of time because there is little to slow down runoff and protect the soil from erosion. The amount of runoff and erosion depend mainly on the area of the watershed, how severely it has been burned, and how steep it is.

A burned-out watershed that drains to the Animas Valley. When a watershed is severely burned, such as this, water runs off rapidly after a shower, like drainage off an asphalt parking lot.

Another condition that adds to the problem is water-repellent soils. When plant materials burn, a gas is created that penetrates the soil. As the soil cools, the gas condenses and forms a waxy layer. This causes the soil to repel water, which increases the rate of water runoff. Less water soaks into the soil, making it difficult for seeds to germinate and for surviving plants to obtain water. We found some degree of water-repellency in all areas of the Missionary Ridge Fire that were burned at higher intensities.

What does all this mean? The short answer is increased flooding, increased amounts of sediments and ash, and increased amounts of debris (rock and logs) from all drainages coming out of the burned area. When intense rainfall occurs, as it does during our monsoon season, these effects can be severe and threatening to life and property at the mouths of these drainages. The threat will be greatest during the remainder of 2002 and through much of next year. The situation will gradually improve as the vegetation and litter layer are restored in the watersheds.

An alluvial fan is a debris deposit at the mouth of a drainage, where floods reach the valley floor and drop their sediments and debris.

Another way to look at the flooding and debris flow problem is to compare it to floods that normally occur at 10, 25, and 100-year intervals. Because of the lack of vegetation in the burned watersheds to intercept the water, a typical heavy summer shower can turn into a 10, 25, or 100-year flood.

Homes built on alluvial fans are in a hazardous location during floods and debris flows. Other structures threatened are roads, bridges, and ditches.

Many homes are built on alluvial fans at the base of these drainages. The fans consist of sediments and debris deposited by floods occurring over thousands of years. While these locations appear to be appealing building sites in normal times, they are hazardous during floods and debris flows. Channels frequently change during floods, and flows can spread over the entire area of the fan. Other problems that are likely to occur are washouts of roads, bridges, and ditches, and general damage to property caused by mud and debris deposits.

Two reservoirs are included in the area of the fire. The possible impacts are ash, silt, and debris deposits, reducing the capacity of the reservoirs and the quality of the water. Expect to see more floating debris in the reservoirs after storms.

Effects on Wildlife

In the initial period after the fire, deer and elk will lose part of their habitat and food supply. But in the long-run they will gain. Plants like oak, aspen, grasses, other shrubs, and herbs increase after a fire, so they provide better habitat and food than was there before the fire. New aspen sprouts are a favorite food of elk and deer. Gradually over time the conifers will take over again.

Within 1 to 2 years, the increased forage on the burned area will attract higher populations of deer and elk.

A fire makes it easier for some animals to find their prey. Beetles are attracted to recently burned areas, and the woodpeckers follow. For the first five years or so after a fire, woodpeckers of all kinds abound in the burn harvesting their favorite food.

Sediment accumulation in streams and reservoirs will damage fish habitat.

For the endangered lynx, the fire took away part of their winter and denning habitat. They will probably be displaced to other areas where spruce-fir forests harbor their favorite food, the snowshoe hare.

Fish in streams and reservoirs will be affected by the fire. Streams receiving drainage from the burned area will receive more silt, ash, and debris — which will effect their spawning habitat and water quality. Floods can carry large quantities of these materials and deposit them in Lemon and Vallecito reservoirs, which could effect water quality.

And what about the bears? As we know, bears are very adaptable. They look for food everywhere, including the burned area.

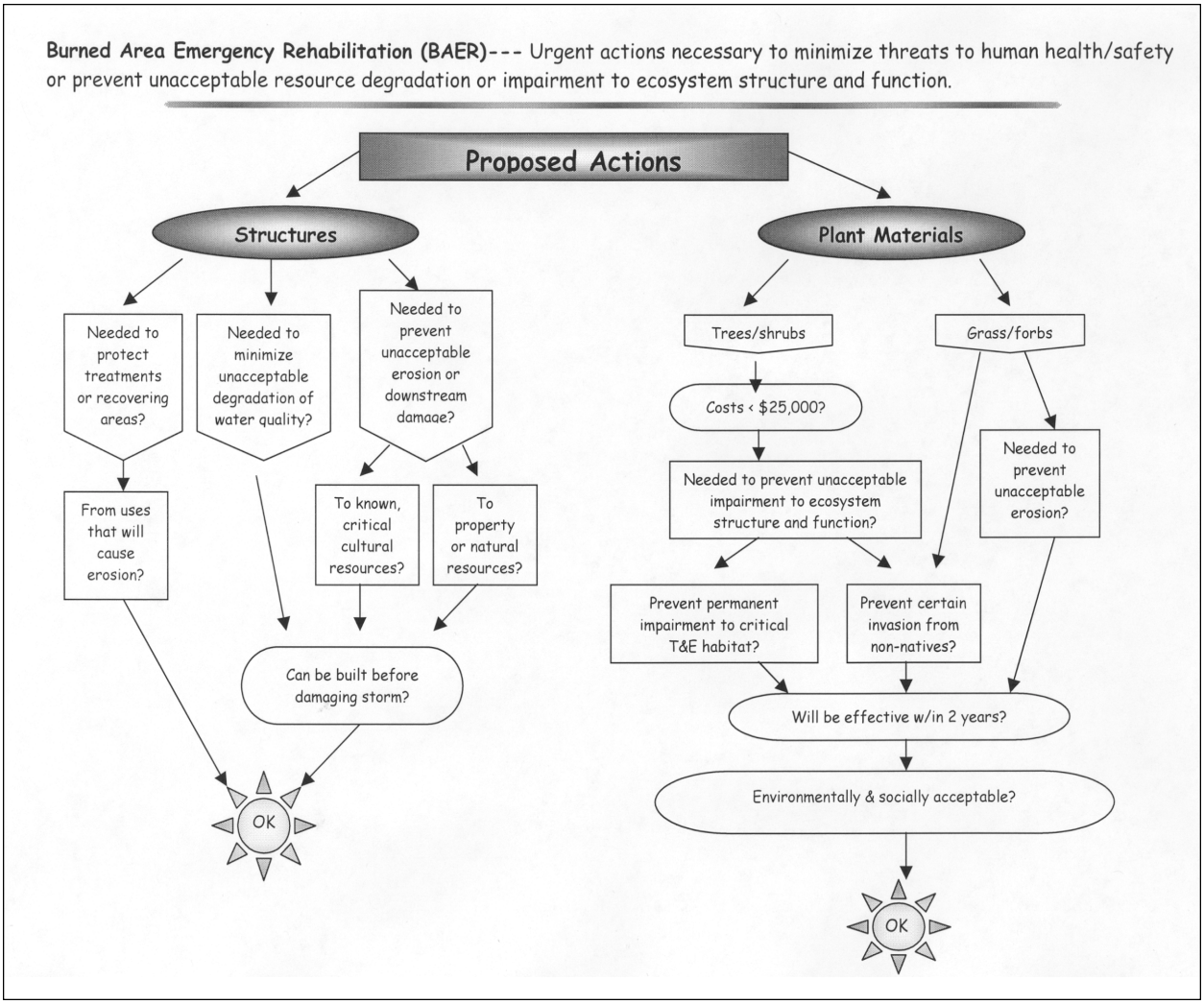
The Rehabilitation Process Begins

Rehabilitation (rehab) consists of various practices to help protect soils, reduce run-off, and restore vital watershed functions. A good example is seeding grass in the severely burned areas, which is an inexpensive way to speed the vegetation recovery process. It is important to note that it is impossible to use rehab practices to "restore" a burned area or "fix" the inevitable problems with flooding and debris flows. The burned area is simply too large and inaccessible. No amount of money or effort will reverse the situation. Rather, rehab efforts are selected and targeted to get the most benefit for the cost. We can assist mother nature in the healing process, but we can't do it for her. The most important need is to restore vegetation in the burned area, so that watersheds will resume their vital process of catching rainfall and releasing it slowly.

Dozer lines built to fight the fire will be rehabilitated soon after the fire is contained.

There are three types of rehab. The first is called "suppression rehab," and it consists of repairing the damage done from fighting the fire. In the Missionary Ridge Fire, officials had to use every means available to keep the fire from spreading into populated areas. After the fire is over, crews need to eliminate miles of fire lines that were built with hand tools and bulldozers. Where these lines cross small drainages, they need to unblock the drainage. About 100 miles of fire lines were built to fight he Missionary Ridge Fire, so "suppression rehab" in itself will be a sizeable job. There are also staging areas and temporary travel routes that need to be restored.

The second type of rehab is called "Burned Area Emergency Rehabilitation" (BAER). The program is focused on urgent actions necessary to minimize threats to human lives and property and to prevent unacceptable resource damage on the National Forest. The Missionary Ridge Fire is a good example of where this rapid response is needed because of the many homes and two reservoirs that can be affected in the aftermath of the fire. On July 1, before the fires were contained, a team of experts assembled and began to identify "values at risk", which are specific homes, roads, irrigation ditches, reservoirs, etc. that lie in harm's way. The team then applied computer models to estimate the amount of water and debris that are likely to flow from individual watersheds that can damage the identified structures or facilities. Since most of the "values at risk" are on private lands, the team communicates their information to local officials and other agencies who, in turn, work with private landowners. The BAER program also funds



Flow chart showing the process the BAER team uses to assess fire effects on the National Forest, and predict potential impacts to life and property off the National Forest

cost-effective treatments on National Forest lands that will reduce impacts, and early warning systems to provide flooding alerts when heavy rains occur in the watersheds.

Besides the focus on "values at risk" to flood and debris damage, the BAER team also assesses the impacts of the fire on a variety of forest resources. An important one is the vegetation recovery assessment. The objective is to predict what kinds of vegetation will return after the fire, how soon it


An early warning system such as this measures rainfall intensity and amount. When a flooding threshold is triggered, it sends a warning via satellite to the county emergency response center.

will happen, and if any rehab practices are needed to assist natural processes. This information is used by people involved in all aspects of the post-fire recovery. The BAER team completes its assessment very quickly, so that the information is available to all stakeholders as soon as possible. The team presented preliminary information on July 8, and will release its final report on July 15.

The third kind of rehab is called “long-term rehabilitation”. This is the less urgent work of replacing, for example, burned campground facilities, signs, bridges on trails, and grazing allotment facilities. Noxious weeds are also monitored and treated.

The Healing Process Takes Time

In just a few days, the Missionary Ridge Fire drastically changed a large chunk of our local landscape. We have witnessed a natural event that occurs about once every 100 years. It will take decades for a total recovery to occur. But we don’t have to wait long before we can resume many of the same activities we have long enjoyed in the area. When the roads and trails are reopened, we can travel through the burned area and observe for ourselves how fast the forest recovers. In a few years, many species of wildlife will be more abundant in the burned area than they were before. Yes, there will be burned snags to remind us of the fire, but the “black” will quickly be replaced by “green”. Nature has demonstrated the powerful and belittling forces of a large forest fire, now she will impress us again with the gentler forces of the healing process. The entire experience has impacted every member of our community, and we have gained a new respect for the power of mother nature and a better understanding of the dynamics of the environment we live in.

Vegetation recovery 2 to 3 years after a wildfire. Many species regenerate rapidly. The trunks of the dead conifers will stand for years awaiting new seedlings to grow and take their place.

Will Rietveld, USFS
BAER Team Member
July, 2002

Burned Area Emergency Response Team